

## HYBRID MOBILE ARM

Sheik Mastanvali<sup>1</sup>, Vamsi Krishna Paladugu<sup>2</sup>, TarunnNagineeni<sup>3</sup>,  
Janaki Raghava Tiruvuru<sup>4</sup>, Sailaja Bonu<sup>5</sup>

<sup>1,2,3,4,5</sup> Department of Electronics and Communication Engineering  
Lingayas Institute Of Management And Technology  
Vivek Nagar, Madalavarigudem, Via Nunna, Vijayawada.

**Abstract**— This paper presents a Hybrid Mobile Arm which is mainly useful for military and home usage. The main base of the Hybrid Mobile Arm is controlled using hand gestures and the upper Arm part is controlled by using a mobile phone by using the DTMF technology in it. The entire robot is controlled wirelessly and all the robot functioning is controlled manually .

**Key words**- Gesture, Accelerometer, DTMF.

### I. INTRODUCTION

With the help of advancements in the latest technologies many embedded systems have been developed to serve the military and home usage. Robots like iRobot warrior 710 have been developed to serve the military troops. A hybrid mobile arm can be used in the military like as the robot is controlled manually it can be used to dismantle the bombs. These robots can also be used for attacking the enemy troops and they are also used for spying. These robots are also helpful for the people who work at home and office. After coming from the office in the evening they just do all the work at home using these kinds of robots by simply controlling them with hand gestures and mobile phone.

### II. METHODS

The size of the hybrid mobile arm is 50 cm long, 40 cm wide and 28 cm tall [3] when folded. The maximum working area in radius is about 300 cm. The robotic arm has seven dc motors. They are controlled by the microcontroller. The robotic arm is capable of holding an unopened 500-ml plastic bottle. From the experimental setup shown in the figure 2.1 the entire functioning will be as follows. The rover part is controlled by using accelerometer. The human hand will consist of an accelerometer

module which will sense the change in the position of the human hand and sends the signals to the micro controller.

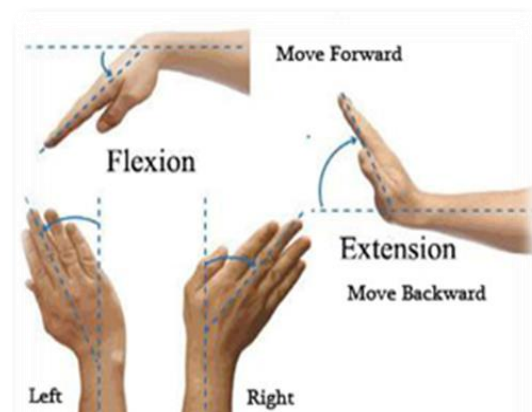


Figure 2.1: accelerometer module which will sense the change

The signals from the micro controller are transmitted using RF transmitter. The rover is having RF receiver to receive the signals from the transmitter. The rover then changes its position according to the program or the code that is present in the controller present in the rover.

Accelerometer is an electro mechanical device which will measure the force of acceleration. Different types of acceleration sensors are available like Analog and Digital sensors. ADXL335 is an analog sensor which will sense the change in the position or which will sense the changes in the angle corresponding to the earth geo-axis. The ADXL335 sensor can sense the three axis changes and can give three different outputs at a time. It has small and low profile package with low power requirement of 350μA (typical). It is mainly used in electronic appliances.

The accelerometer uses the RF module for transmission and reception of the signals which are in the range of radio frequency. Encoder and Decoder is to encode the signals that is to be

transmitted and the decoder then decodes the received signals to extract the original signal at the receiver end.

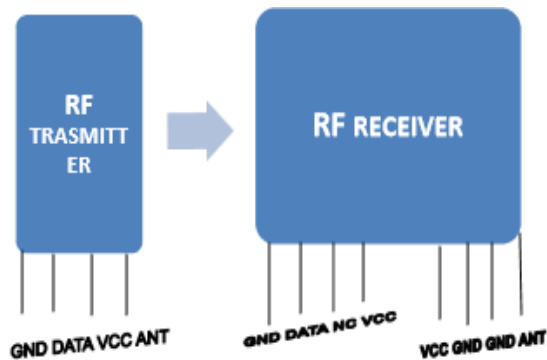
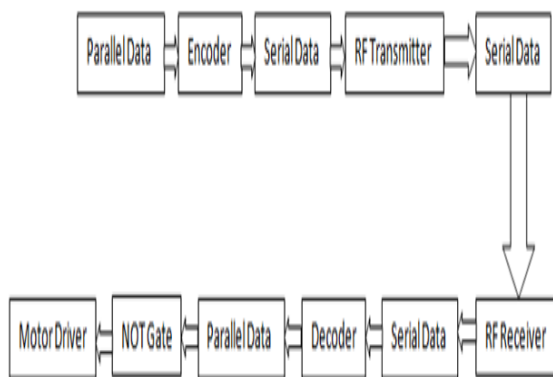


Figure 2.2 The RF transmission system

The RF transmission system uses the Amplitude Shift Keying model that is operating at frequency of 434MHz.

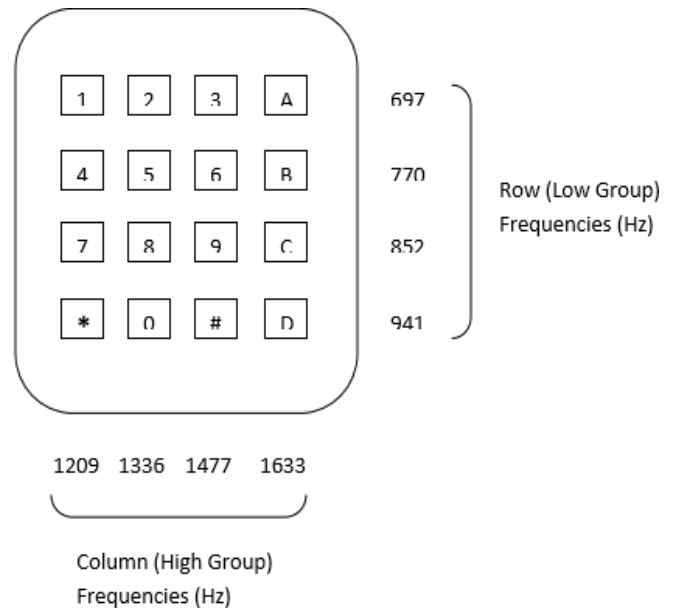
The hybrid mobile arm consists of micro controllers which will control the data transfer between the RF transmitter and RF receiver.



The Arm and gripper movement is controlled using mobile phone with the help of DTMF technology. When the keys of the mobile dialer is pressed the signals from the phone will be decoded by the DTMF module present in the robot. By this the robot arm and gripper movements can be controlled according to the program assigned to the DTMF module.

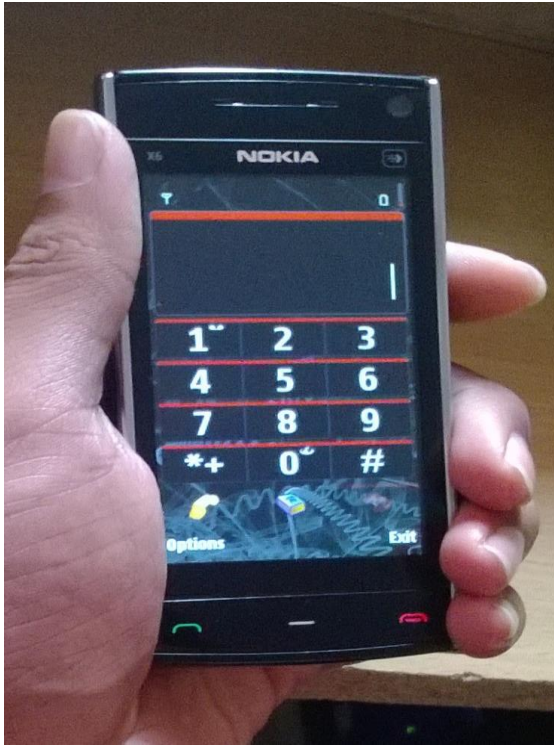
DTMF as the name suggests Dual Tone Multi Frequency which is a combination of two frequencies to generate a new frequency value. It is having two group of frequencies which will be arranged in horizontal and vertical manner. The horizontal lines are having high group frequencies

ranging from 1209 to 1633 Hz. The vertical lines are having low group frequencies ranging from 697 to 941Hz. The keypad is arranged in a 4x4 matrix structure, which consists of rows and columns. The column frequencies are 1209Hz, 1336Hz, 1477Hz, 1633Hz. The row frequencies are 697Hz, 770Hz, 852Hz, 941Hz.



The frequency for a particular key is generated by the combination of column frequency and the row frequency. Every key in the keypad will generate a unique frequency for each key.

Whenever if we press a particular key in the keypad the frequency that is related to the particular row is combined with the frequency that is related to the particular column. In this way the multiple frequency values are generated.



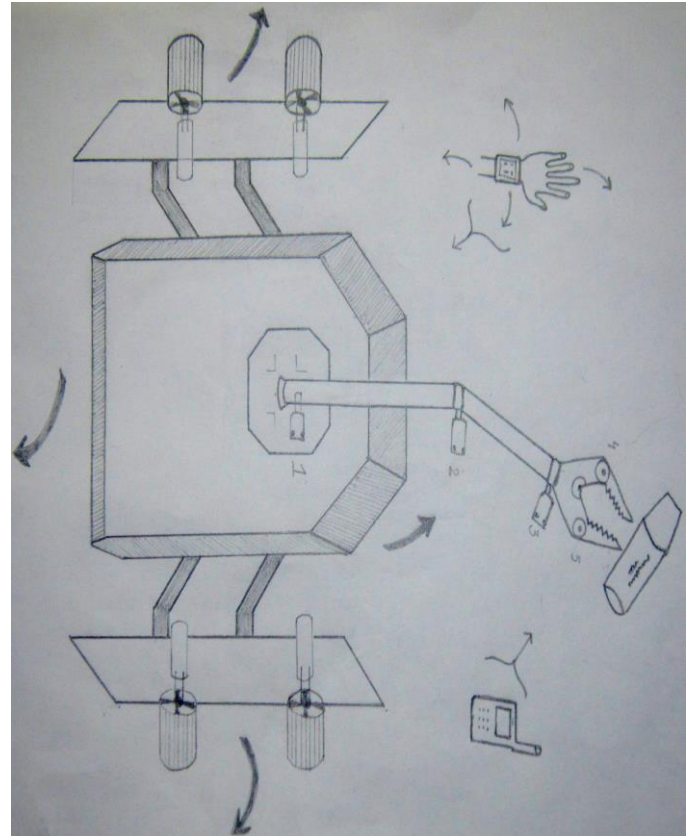
A gripper is a component of the robot used to manipulate an object loose from the robot itself. This can be a ball it needs to pick up, or the dirty socks it was programmed to find and dispose of. Grippers exist in many varieties ranging from simple; a thong like design to complex arms.

The gripper which we are using for this hybrid mobile arm is an acrylic robo gripper which is mainly used due to its light weight and its simple controlling.



### III. RESULTS

It can be observed that the rover position is changing by the hand movement which consists of sensor module and the arm & gripper control is done by mobile phone to hold and move the objects.



From the above diagram and procedure a Hybrid Robo Arm can be designed and implemented. This type of robots can serve the military troops and can help the people in the house effectively.

### IV. CONCLUSION

It was demonstrated that using the Hybrid Mobile Arm the path for the future technologies can be pushed beyond the barriers and can serve humans effectively in every application on which these robot is used.

### REFERENCES



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